

REMARKS

Applicants have amended claims 1, 6, 7, and 12 to more particularly point out and distinctly claim the subject matter which they regard as their invention. Support for the amendments can be found in the specification.¹ Claim 5 was previously cancelled. No new matter has been introduced.

Upon entry of the above amendments, claims 1-4 and 6-12 will be pending and under examination. Reconsideration of this application, as amended, is respectfully requested.

Objections

The Examiner pointed out several defects in the drawings, specifications, and claims. Applicants have corrected them accordingly.

Rejection under 35 U.S.C. 112, second paragraph

The Examiner rejected claims 1-4 and 6-12 for indefiniteness. More specifically, he identified two type of deficiencies: (1) the term "friction pad," "press plate," and "portion facing each other" recited in claim 1 and "press pad" recited in claim 12 do not have antecedent basis; and (2) claims 6 and 7 depend from cancelled claim 5. Applicants have amended claims 1, 6, 7, and 12 to rectify all the deficiencies.

Rejection under 35 U.S.C. 103(a)

The Examiner rejects claims 1-4 and 6-12 on three grounds, each of which is traversed below:

I

Claims 1-4, 11, and 12 are rejected for obviousness over Heinrich, U.S. Patent 1,979,880

¹ Claim 1, as amended, recites "a flywheel having a friction pad" and "a clutch cover having a press plate." Support for the amendment appears in Figure 2. It also recites "carbon-carbon composition which is composed of 20~75 weight % graphitized carbon fiber and 25~80 weight % pitch." The recited ranges appear in original claim 5, and the term "graphitized carbon fiber" is supported by the specification at page 3, lines 19-26 and page 8, lines 10-25. Claims 6 and 7 have been amended to change their dependency as necessitated by cancellation of claim 5, from which they originally depended. Claim 12, as amended, recites "the press plate is provided with a press pad," support for which can be found in Figure 2.

(Heinrich) in view of Miyoshi et al., U.S. Patent 5,395,864 (Miyoshi) and Diemer et al., U.S. Patent Application Publication 20020014386 (Diemer). Claim 1, the only independent claim, will be discussed first.

Claim 1, as amended, covers a clutch for transmitting power, which includes a flywheel, a clutch cover, and a clutch disk assembly, the clutch disk assembly having a clutch facing with a contacting portion made of a carbon-carbon composition containing both graphitized carbon fiber and pitch.

Heinrich discloses a clutch including a flywheel, a clutch cover, and a clutch disk assembly. The clutch disk assembly has a clutch facing. However, as correctly pointed out by the Examiner, "Heinrich does not disclose the [recited] carbon-carbon composition disposed on a clutch facing."² See the Office Action, page 5, lines 13-14. It therefore follows that this reference also does not disclose a clutch facing made of a carbon-carbon composition containing both graphitized carbon fiber and pitch.

Neither Miyoshi nor Diemer cures this deficiency. Both references are silent on a carbon-carbon composition containing both graphitized carbon fiber and pitch.

Miyoshi discloses a friction element useful in a clutch. The friction element includes activated carbon fiber. Activated carbon fiber has different mechanical properties from graphitized carbon fiber, even though both fibers can be prepared from the same substance.³ For example, activated carbon fiber prepared from pitch or polyacrylonitrile has a low carbonization rate (e.g., 30-60%) and a low tensile strength ($<100 \text{ kg/mm}^2$), while graphitized carbon fiber prepared from the same substance has a high carbonization rate (e.g., 92-99%) and a high tensile strength ($>500 \text{ kg/mm}^2$). Given these differences, activated carbon fiber is distinguishable from graphitized carbon fiber. Miyoshi only discloses use of activated carbon fiber. It does not disclose or suggest using graphitized carbon fiber in a clutch part. In addition, it also fails to

² The Examiner incorrectly used the term "the claimed carbon-carbon composition." Indeed, the claims at issue are directed to a clutch, not a carbon-carbon composition.

³ Activated carbon fiber and graphitized carbon fiber are prepared by different processes. Activated carbon fiber is produced by carbonizing and activating carbon fiber at high temperature in an oxidizing atmosphere (e.g., ozone or nitrogen monoxide). Graphitized carbon fiber, on the other hand, is produced by carbonizing and graphitizing carbon fiber at a high temperature in an inert atmosphere (e.g., argon, or nitrogen).

mention using pitch in a clutch part. Thus, Miyoshi does not teach or suggest using in a clutch part a carbon-carbon composition containing both graphitized carbon fiber and pitch, as required by claim 1.

Diemer discloses a friction clutch in which friction pads are positioned on a flywheel and a pressure plate. It also suggests that “[g]lobular graphite cast iron (GGG), compacted graphite cast iron (GGV), aluminum, fiber/particle-reinforced aluminum, and aluminum alloys are especially advantageous materials for the flywheel 14 and the pressure plate 16.” See page 3, left column, lines 8-12. Nowhere in this reference is mentioned graphitized carbon fiber or pitch, let alone a composition containing both graphitized carbon fiber and pitch. Thus, like Heinrich and Miyoshi, Diemer also fails to disclose or suggest using a carbon-carbon composition containing both graphitized carbon fiber and pitch, as required by claim 1.

In sum, none of Heinrich, Miyoshi, and Diemer teaches or suggests using both graphitized carbon fiber and pitch to make a clutch part. As such, a combination of these three references also fails to do so. Claim 1, which requires a clutch part containing both graphitized carbon fiber and pitch, is clearly not rendered obvious by these three references, either taken alone or combined together.

For the same reasons set forth above, claims 2-4, 11, and 12, dependent from claim 1, are also not rendered obvious by these three references.

II

The Examiner rejected claim 8 for obviousness over Heinrich, Miyoshi, and Diemer, and further in view of Hubbard et al., U.S. 6,514,592 (Hubbard); and claims 6, 7, 9, and 10 are rejected for obviousness over Heinrich, Miyoshi, Diemer, and Hubbard, and further in view of Kani, U.S. 5,395,864 (Kani).

The patentability of claims 6-10 resides at least in part in use of both graphitized carbon fiber and pitch in a clutch part, as required by claim 1, from which these claims depend.

As discussed above, none of Heinrich, Miyoshi, and Diemer teaches or suggests using both graphitized carbon fiber and pitch in a clutch part. Hubbard and Kani fail to cure this deficiency. Hubbard teaches a friction material used for a clutch containing silicon carbide.

Kani teaches manufacturing clutch facings using single woven fibers. Neither of these two references even mentions using both graphitized carbon fiber and pitch in a clutch part.

In sum, none of Heinrich, Miyoshi, Diemer, Hubbard, and Kani teaches or suggests using both graphitized carbon fiber and pitch in a clutch part. Thus, claims 6-10, which require use of both graphitized carbon fiber and pitch in a clutch part, are not rendered by these five references, taken alone or in any combination.

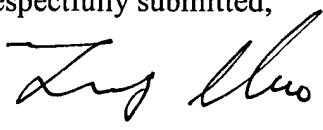
CONCLUSION

Applicants submit that the rejections asserted by the Examiner have been overcome and claims 1-4 and 6-12, as pending, cover subject matter that is definite and nonobvious over the cited prior art. Prompt allowance of these claims are respectfully requested.

Enclosed is a \$60 check for the Petition for Extension of Time fee. Please apply any other charges or credits to deposit account 06-1050.

Respectfully submitted,

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 Reg. No.: 54,694

for

Y. Rocky Tsao, Ph.D., J.D.
Attorney for Applicants
Reg. No. 34,053

Fish & Richardson P.C.
225 Franklin Street
Boston, MA 02110
Telephone: (617) 542-5070
Facsimile: (617) 542-8906

Amendments to the Drawings:

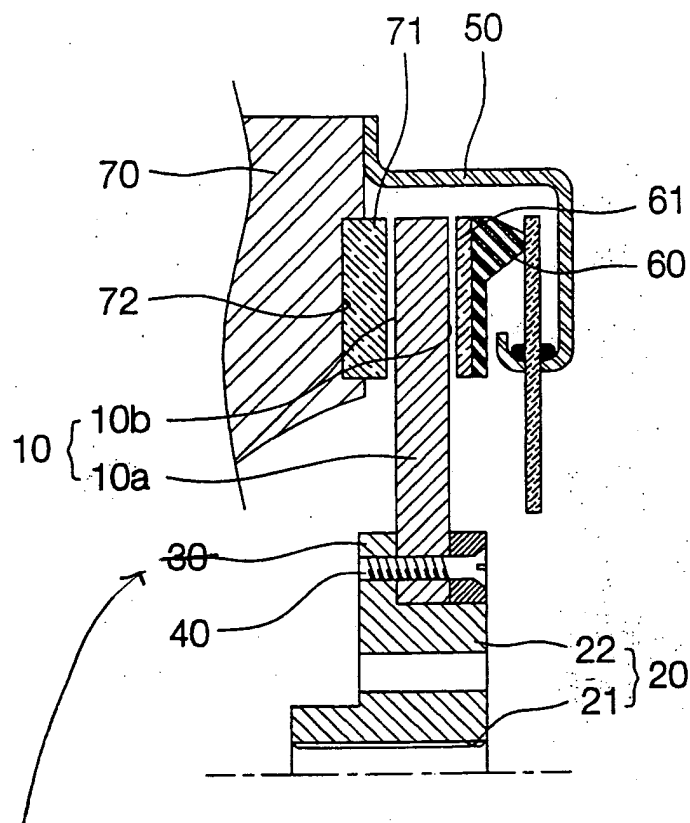
Attached following last page of this Amendment are replacement sheets of drawings (9 pages). The sheets include changes to Figs. 3 and 4 and replace the original sheets including Figs. 1-9.

The Changes are:

In Figure 3, reference numeral "30" has been deleted.

In Figure 4, in the box labeled as "S110," the word "pruducing" has been changed to "producing;" and in the box labeled as "S140," the word "densitication" has been changed to "densification."

FIG 3



delete reference numeral "30"

FIG 4

